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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/594,881

09/02/2008

Maria Pettersson

19200-000069/US

5623

30593 7590 01/26/2010
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EXAMINER

CONLON, MARISA

ART UNIT

PAPER NUMBER

3643

MAIL DATE

DELIVERY MODE

01/26/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/594,881	Applicant(s) PETTERSSON ET AL.	
	Examiner MARISA CONLON	Art Unit 3643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 83-103 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 83-103 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 83 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fransen (U.S. 6,213,051) in view of Cöp (WO 02/00011).

Regarding claim 83, Fransen (at Col. 6, lines 45-67) teaches an arrangement for determining positions of the teats of a milking animal in a milking system including a robot arm for automatically attaching teat cups to the teats of a milking animal when being located in a position to be milked, and a control device for controlling the movement of said robot arm based on determined positions of the teats of the milking animal, said arrangement comprising: a camera pair directed towards the teats of the milking animal when being located in the position to be milked, an image processing device, wherein the camera pair is provided to repeatedly record pairs of images; said camera pair is comprised of a pair of thermal or infrared cameras, each responsive to infrared radiation propagating towards the camera.

Fransen does not explicitly teach an image processing device provided for repeatedly detecting the teats of the milking animal and determining their positions by a stereoscopic calculation method based on said repeatedly recorded pairs of images.

However, Cöp teaches an image processing device for repeatedly detecting the teats of the milking animal and determining their positions by a stereoscopic calculation method based on said repeatedly recorded pairs of images (Pg. 1, line 25 to Pg. 2, line 4; see also Pg. 3, line 34 to Pg. 5, line 12).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of Fransen in view of the teachings of Cöp, in order to achieve accurate three-dimensional information, indicative of the location of the teat.

3. Claims 84 and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birk (WO 99/03064) in view of Cöp (WO 02/00011) and Sjölund (WO 01/52633).

Regarding Claim 84, Birk teaches an arrangement for determining positions of the teats of a milking animal in a milking system including a robot arm (#4) for automatically attaching teat cups (#7) to the teats of a milking animal when being located in a position to be milked, and a control device for controlling the movement of said robot arm based on determined positions of the teats of the milking animal (see Pg. 7), and a first camera pair (#8, see Pg. 7, line 8) directed towards the teats of the milking animal.

Birk does not explicitly teach a first camera pair directed towards the teats of the milking animal when being located in the position to be milked, wherein the first camera pair is provided to repeatedly record pairs of images; and an image processing device provided for repeatedly detecting the teats of the milking animal and determining their

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positions by a stereoscopic calculation method based on said repeatedly recorded pairs of images.

However, Cöp teaches a first camera pair (#9) directed towards the teats of the milking animal when being located in the position to be milked (Figure 1), wherein the first camera pair is provided to repeatedly record pairs of images; and an image processing device provided for repeatedly detecting the teats of the milking animal and determining their positions by a stereoscopic calculation method based on said repeatedly recorded pairs of images (Pg. 1, line 25 to Pg. 2, line 4; and Pg. 3, line 34 to Pg. 5, line 12).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of Birk in view of the teachings of Cöp in order to achieve accurate three-dimensional information, indicative of the location of the teat.

Birk does not explicitly teach an arrangement wherein said image processing device is provided, for each time the teats are to be detected, to apply a motion detection algorithm to reduce the area in which the teats likely are, wherein the difference between two images recorded one after the other by one camera of said first camera pair is analyzed, and the area in which the teats likely are, is reduced by discarding areas in the two images wherein substantially no movement has occurred.

However, Sjölund teaches an arrangement wherein said image processing device is provided, for each time the teats are to be detected, to apply a motion detection algorithm to reduce the area in which the teats likely are, wherein the difference between two images recorded one after the other by one camera of said first

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camera pair is analyzed, and the area in which the teats likely are, is reduced by discarding areas in the two images wherein substantially no movement has occurred (Pgs. 4, 10 and 11).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of Birk in view of the teachings of Sjölund in order to home in on the targeted teats.

Regarding claim 87, the combination of Birk, Cöp and Sjölund teaches all of the structural elements as mentioned in claims 84 above; and Birk teaches said first camera pair is directed towards the teats of the milking animal when being located in the position to be milked is directed so that the teats of the milking animal belong to the outer contour of the milking animal in the repeatedly recorded pairs of images (Pg. 3, lines 2-4; Pg. 4, lines 8-10; see Figures 2 and 3); and said image processing device is provided to further reduce the area in which the teats likely are by a contour creation algorithm (Pg. 3, lines 2-4; Pg. 4, lines 8-10; Pg. 8, lines 21-22).

4. Claims 85 and 93 are is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp and Sjölund as applied to claim 84 above, and in further view of Kent (U.S. 4,601,055).

Regarding claim 85, the combination of Birk, Cöp and Sjölund teaches all of the structural elements as mentioned in claim 84; but the combination does not explicitly

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teach wherein said image processing device is provided to reduce scatter in the reduced area in which the teats likely are by applying a relaxation algorithm.

However, Kent teaches an image processing device that is provided to reduce scatter by applying a relaxation algorithm (see Col. 6, lines 7-24).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp and Sjölund combination such that the image processing device reduces scatter by applying a relaxation algorithm, as taught by Kent, in order to improve the resolution of the image.

Regarding claim 93, the combination of Birk, Cöp, Sjölund and Kent teaches all of the structural elements as mentioned in claim 85 above, and Birk teaches said first camera pair is directed towards the teats of the milking animal when being located in the position to be milked is directed so that the teats of the milking animal belong to the outer contour of the milking animal in the repeatedly recorded pairs of images (Pg. 3, lines 2-4; Pg. 4, lines 8-10; see Figures 2 and 3); and said image processing device is provided to further reduce the area in which the teats likely are by a contour creation algorithm (Pg. 3, lines 2-4; Pg. 4, lines 8-10; Pg. 8, lines 21-22).

5. Claims 86 and 94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birk, Cöp and Sjölund as applied to claim 84 above, and in further view of Graves et al. (U.S. 2004/0247186)

Regarding claim 86, the combination of Birk, Cöp and Sjölund teaches all of the structural elements as mentioned in claim 84 above; but the combination does not explicitly teach wherein said image processing device is provided to enlarge the reduced area in which the teats likely are by a pixel expanding algorithm.

However, Graves et al. teaches an image processing device to enlarge the reduced area in which the teats likely are by a pixel expanding algorithm (see [0025]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp and Sjölund combination such that the image processing device applies a pixel expanding algorithm, as taught by Graves et al., in order to bolster the arrangement's ability to home in on the targeted teats.

Regarding claim 94, the combination of Birk, Cöp, Sjölund and Graves et al. teaches all of the structural elements as mentioned in claim 86 above; and Birk teaches said first camera pair is directed towards the teats of the milking animal when being located in the position to be milked is directed so that the teats of the milking animal belong to the outer contour of the milking animal in the repeatedly recorded pairs of images (Pg. 3, lines 2-4; Pg. 4, lines 8-10; see Figures 2 and 3); and said image processing device is provided to further reduce the area in which the teats likely are by a contour creation algorithm (Pg. 3, lines 2-4; Pg. 4, lines 8-10; Pg. 8, lines 21-22).

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6. Claims 88,97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp and Sjölund as applied to claims 84,87 above, and in further view of Linguraru et al. (U.S. 2005/0213841).

The combination of Birk, Cöp and Sjölund teaches all of the structural elements as mentioned in claim 84 above; but the combination does not explicitly teach an image processing device that is provided for each time the teats are to be detected, to apply an edge detection algorithm based on the phase congruency model of feature detection to thereby find edges and corners in a recorded pair of images that most likely include those of the teats of the milking animal.

However, Linguraru et al. teaches an image processing device that applies an edge detection algorithm based on the phase congruency model of feature detection ([0035]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp and Sjölund combination such that the image processing device applies an edge detection algorithm based on the phase congruency model of feature detection, as taught by Linguraru et al., depending on the user's preference to select a known mathematical algorithm to achieve the same desired result, namely accurate edge detection.

7. Claim 89 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp, Sjölund and Linguraru et al. as applied to claims 84,88 above, and further in view of Johnson (U.S. 2007/0064986).

Regarding claim 89, the combination of Birk, Cöp, Sjölund and Linguraru et al. teaches all of the structural elements as mentioned in claim 88 above; but the combination does not explicitly teach wherein said image processing device is provided, for each time the teats are to be detected, to apply a Canny detection algorithm to thereby find edges in a recorded pair of images that most likely include those of the teats of the milking animal.

However, Johnson teaches an image processing device that applies a Canny detection algorithm to find edges (see [0033]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp, Sjölund and Linguraru et al. combination such that the image processing device applies a Canny detection algorithm to find edges, as taught by Johnson, depending on the user's preference to select a known mathematical algorithm to achieve the same desired result, namely accurate edge detection.

8. Claims 90,91 and 98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp, Sjölund and Linguraru et al. as applied to claims 84,88,89 above, and further in view of Loce et al. (U.S. 6,807,304).

Regarding claims 90 & 98, the combination of Birk, Cöp, Sjölund and Linguraru et al. teaches all of the structural elements as mentioned in claim 88 above; but the combination does not explicitly teach wherein said image processing device is provided,

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for each time the teats are to be detected, to apply a labeling algorithm for calculating features of the found edges and corners in the recorded pair of images.

However, Loce et al. teaches an image processing device that applies a labeling algorithm for calculating features of found edges corners in images (see Col. 8, lines 46-60; Col. 10, lines 6-26; Col. 14, lines 52-65).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp, Sjölund and Linguraru et al. combination such that the image processing device applies a labeling algorithm, as taught by Loce et al., in order for the processor to perform matching operations and thus recognize features of the teat, such as corners.

Regarding claim 91, the combination of Birk, Cöp, Sjölund, Linguraru et al. and Loce et al. teaches all of the structural elements as mentioned in claim 90 above, and Loce et al. teaches wherein said image processing device applies matching algorithm for identifying edges and corners of the found edges and comers in the images (Col. 14, lines 52-65).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp, Sjölund and Linguraru et al. combination such that the image processing device applies a matching algorithm, as taught by Luce et al., in order to recognize features of the teat, such as corners.

The combination does not explicitly teach wherein the matching algorithm is a hierarchical chamfer matching algorithm.

However, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk, Cöp, Sjölund, Linguraru et al. and Luce et al. combination such that the matching algorithm is a hierarchical chamfer matching algorithm, depending on the user's preference to select a known mathematical algorithm to achieve the same desired result, namely to recognize features of the teat.

9. Claim 92 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp, Sjölund and Kent applied to claims 84-85 above, and further in view of Graves et al.

Please see the reasoning above, particularly the analysis of claims 85 and 86.

10. Claim 95 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp, Sjölund and Kent as applied to claims 84-85 above, and further in view of Linguraru et al.

Please see the reasoning above, particularly the analysis of claims 85 and 88.

11. Claim 96 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp, Sjölund and Graves et al. as applied to claims 84,86 above, and further in view of Linguraru et al.

Please see the reasoning above, particularly the analysis of claims 86 and 88.

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12. Claim 99 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk (WO 99/03064) in view of Cöp (WO 02/00011) and Linguraru et al. (U.S. 2005/0213841).

Regarding claim 99, Birk teaches an arrangement for determining positions of the teats of a milking animal in a milking system including a robot arm (#4) for automatically attaching teat cups (#7) to the teats of a milking animal when being located in a position to be milked, and a control device for controlling the movement of said robot arm based on determined positions of the teats of the milking animal (see Pg. 7), and a first camera pair directed towards the teats of the milking animal (#8, see Pg. 7, line 8).

Birk does not explicitly teach a first camera pair directed towards the teats of the milking animal when being located in the position to be milked, wherein the first camera pair is provided to repeatedly record pairs of images; and an image processing device provided for repeatedly detecting the teats of the milking animal and determining their positions by a stereoscopic calculation method based on said repeatedly recorded pairs of images.

However, Cöp teaches a first camera pair (#9) directed towards the teats of the milking animal when being located in the position to be milked (Figure 1), wherein the first camera pair is provided to repeatedly record pairs of images; and an image processing device provided for repeatedly detecting the teats of the milking animal and determining their positions by a stereoscopic calculation method based on said repeatedly recorded pairs of images (Pg. 1, line 25 to Pg. 2, line 4; and Pg. 3, line 34 to Pg. 5, line 12).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of Birk in view of the teachings of Cöp in order to achieve accurate three-dimensional information, indicative of the location of the teat.

The combination of Birk and Cöp is silent on which particular edge detection algorithm the image processing device applies in order to find the edges and corners of the teats; and so the combination does not explicitly teach wherein said image processing device is provided, for each time the teat are to be detected, to apply an edge detection algorithm based on the phase congruency model of feature detection to thereby find edges and comers in a recorded pair of images that most likely include those of the teats of the milking animal.

However, Linguraru et al. teaches an image processing device that applies an edge detection algorithm based on the phase congruency model of feature detection ([0335]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the arrangement of the Birk and Cöp combination such that the image processing device applies an edge detection algorithm based on the phase congruency model, as taught by Linguraru et al., depending on the user's preference to select a known mathematical algorithm to achieve the same desired result, namely accurate edge detection.

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13. Claim 100 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp and Linguraru et al. as applied to claim 99 above, and further in view of Johnson.

Please see the reasoning above, particularly the analysis of claims 99 and 88.

14. Claims 101 and 102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp and Linguraru et al. as applied to claim 99 above, and further in view of Loce et al.

Please see the reasoning above, particularly the analysis of claims 99, 90 and 91.

15. Claim 103 is rejected under 35 U.S.C. 103(a) as being unpatentable over Birk in view of Cöp, Linguraru et al. and Johnson as applied to claims 99,100 above, and further in view of Loce et al.

Please see the reasoning above, particularly the analysis of claims 100 and 98.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARISA CONLON whose telephone number is (571)270-5739. The examiner can normally be reached on Monday-Friday 8:30-6:00, with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Poon can be reached on (571)272-6891. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. C./

Patent Examiner, Art Unit 3643

/Son T. Nguyen/

Primary Examiner, Art Unit 3643